

DATORKER® strain wave gears

DGC-PO

13. DGC-PO

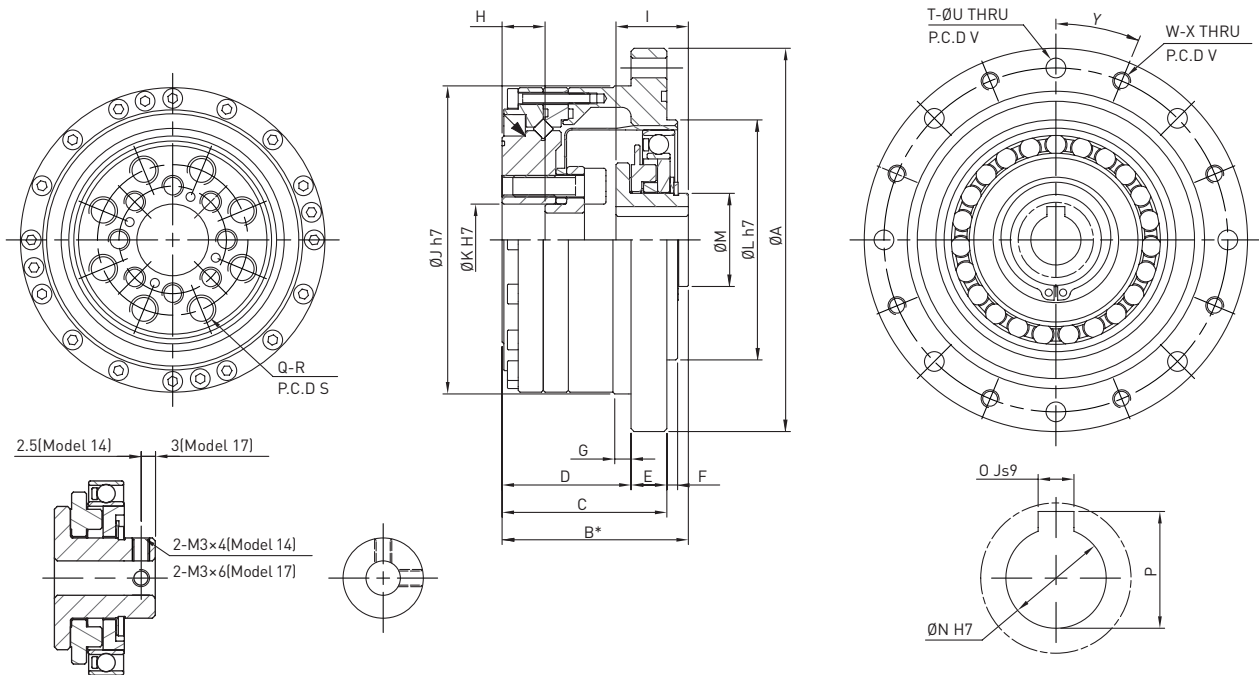


Table 12.9 Dimensions of DGC-PO-Strain wave gears

	Unit	Model/size				
		14	17	20	25	32
ØA	mm	73	79	93	107	138
B ¹⁾	mm	41 ^{-0.9}	45 ^{-0.9}	45.5 ^{-1.0}	52 ^{-1.0}	62.0 ^{-1.1}
C	mm	34	37	38	46	57
D	mm	27	29	28	36	45
E	mm	7	8	10	10	12
F	mm	2	2	3	3	3
G	mm	3.5	4	5	5	5
H	mm	9.4	9.5	9	12	15
I	mm	18.5 ^{-0.1}	20.7 ^{-0.1}	21.5 ^{-0.1}	21.6 ^{-0.1}	23.6 ^{-0.1}
ØJ h7	mm	56	63	72	86	113
ØK H7	mm	11	10	14	20	26
ØL h7	mm	38	48	56	67	90
ØM	mm	14	18	21	26	26
ØN H7	mm	6	8	12	14	14
O Js9	mm	-	-	4	5	5
P	mm	-	-	13.8 ^{+0.1}	16.3 ^{+0.1}	16.3 ^{+0.1}
Q	mm	6	6	8	8	8
R		M4 × 8DP	M5 × 10DP	M6 × 9DP	M8 × 12DP	M10 × 15DP
S (P.C.D)	mm	23	27	32	42	55
T	mm	8	8	8	10	12
ØU	mm	4.5	4.5	5.5	5.5	6.6
V (P.C.D)	mm	65	71	82	96	125
W	mm	8	8	8	10	12
X		M4	M4	M5	M5	M6
Y	Degree	22.5	22.5	22.5	18	15
Moment of inertia	×10 ⁻⁴ kgm ²	0.033	0.079	0.193	0.413	1.690
Weight	kg	0.52	0.68	0.98	1.5	3.2

¹⁾ B is the tolerance and the matching position of axial direction.

13.1 DGC-P0 design

13.1.1 Technical data

Table 13.1 Crossed roller bearing specifications

Model/size	Centre circle diameter of the rollers	Offset	Basic load ratings		Permitted torque	Moment rigidity
	Dpw	R	Dynamic load C _{dyn}	Static load C ₀		
	m	m	kN	kN		
14	0.035	0.0095	4.7	6.1	41	4.38
17	0.0425	0.0095	5.3	7.6	64	7.75
20	0.05	0.0095	5.8	9.0	91	12.8
25	0.062	0.0115	9.6	15.1	156	24.2
32	0.08	0.013	15	25	313	53.9

Table 13.2 Accuracy of angular transmission

Reduction ratio		Model/size				
		14	17	20	25	32
50 – 160	$\times 10^{-4}$ rad	4.4	4.4	2.9	2.9	2.9

Table 13.3 Hysteresis loss

Reduction ratio		Model/size				
		14	17	20	25	32
50	$\times 10^{-4}$ rad	5.8	5.8	5.8	5.8	5.8
80 – 160	$\times 10^{-4}$ rad	2.9	2.9	2.9	2.9	2.9

Table 13.4 Starting torque

Reduction ratio		Model/size				
		14	17	20	25	32
50		4.5	6.7	8.6	17	34
80		3.1	4.4	5.4	10	21
100		2.8	3.7	4.7	8.8	20
120		—	3.4	4.2	8.0	17
160		—	—	3.6	6.9	15

Unit: cNm

Note: The values in this table vary depending on the working conditions and are for reference purposes only. The upper limit is 20 % above the value in this table.

Table 13.5 Reverse starting torque

Reduction ratio		Model/size				
		14	17	20	25	32
50		1.8	3.3	5.2	9.9	20
80		1.8	3.3	5.3	10	21
100		2	3.6	5.6	11	22
120		—	3.9	6.1	12	24
160		—	—	7	14	29

Unit: Nm

Note: The values in this table vary depending on the working conditions and are for reference purposes only. The upper limit is 20 % above the value in this table.

Table 13.6 Torsional rigidity							
Reduction ratio			Model/size				
			14	17	20	25	32
T1		Nm	2.0	3.9	7.0	14.0	29.0
T2		Nm	6.9	12.0	25.0	48.0	108.0
50	K ₁	×10 ⁴ Nm/rad	0.34	0.81	1.30	2.50	5.40
	K ₂	×10 ⁴ Nm/rad	0.47	1.10	1.80	3.40	7.80
	K ₃	×10 ⁴ Nm/rad	0.57	1.30	2.30	4.40	9.80
	θ ₁	×10 ⁻⁴ rad	5.8	4.9	5.2	5.5	5.5
	θ ₂	×10 ⁻⁴ rad	16.0	12.0	15.4	15.7	15.7
80 – 160	K ₁	×10 ⁴ Nm/rad	0.47	1.00	1.60	3.10	6.70
	K ₂	×10 ⁴ Nm/rad	0.61	1.40	2.50	5.00	11.00
	K ₃	×10 ⁴ Nm/rad	0.71	1.60	2.90	5.70	12.00
	θ ₁	×10 ⁻⁴ rad	4.1	3.9	4.4	4.4	4.4
	θ ₂	×10 ⁻⁴ rad	12.0	9.7	11.3	11.1	11.6

The values are for reference purposes only. The lower limit is 20 % below the value in this table.

13.1.2 Efficiency E_R

The efficiency of DATORKER® shaft gear units changes depending on the specification, load ratio, operating conditions (speed/load) and lubrication (lubricant type/amount).

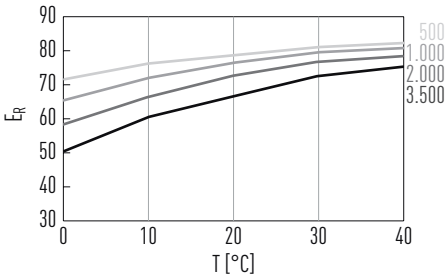
E_R Efficiency at nominal torque

T Temperature

Unit: rpm

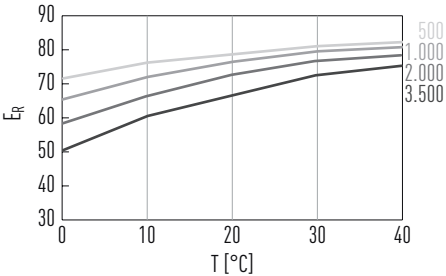
Model: 14

Ratio: 50



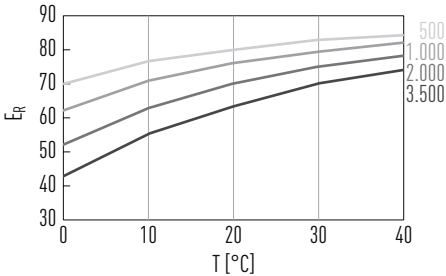
Model: 14

Ratio: 80



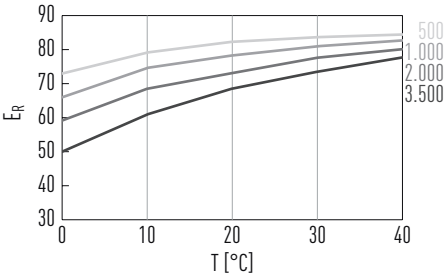
Model: 14

Ratio: 100



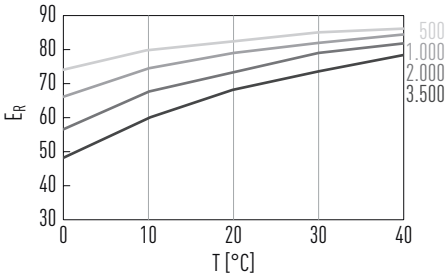
Model: 17-32

Ratio: 50



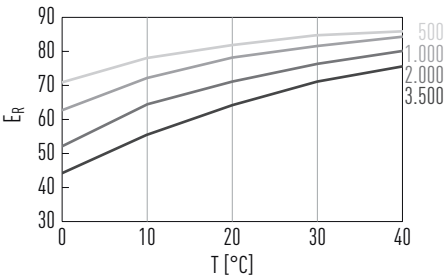
Model: 17-32

Ratio: 80, 100



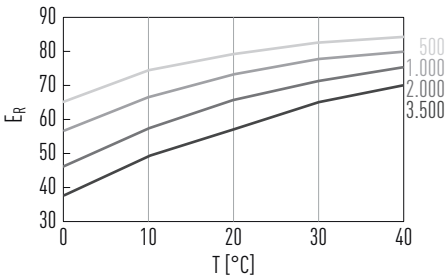
Model: 17-32

Ratio: 120



Model: 20-32

Ratio: 160



Correction coefficient α

$$\text{Efficiency} = \alpha \times E_R$$

$$\text{Efficiency} = \alpha \times E_R$$

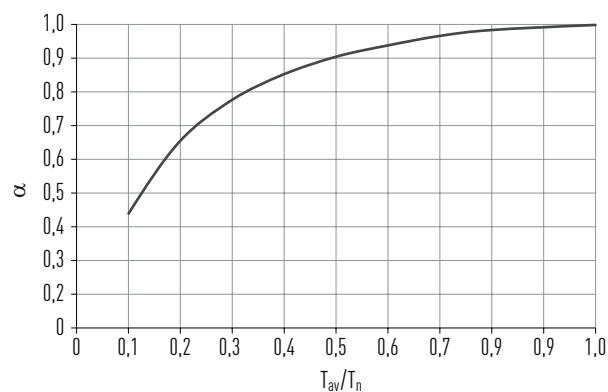
α Correction coefficient

E_R Efficiency at nominal torque

T_{av} Average load torque

T_n Rated torque

T_{av}/T_n Torque ratio



13.1.3 Idling operating torque

The idling operating torque is the torque required to drive the DATORKER® shaft gear input (high speed end) after more than 2 hours at an input speed of 2,000 rpm at an average ambient temperature of 25 °C without load.

Table 13.7 Idling operating torque

Reduction ratio	Input speed [rpm]	Model/size				
		14	17	20	25	32
50	500	3.2	5.1	7.3	12.8	26.1
	1.000	3.9	6.1	9.1	17.8	33.1
	2.000	4.6	7.6	11.8	21.8	44.1
	3.500	5.9	9.6	12.7	28.8	57.1
80	500	2.3	3.8	5.5	9.7	20.3
	1.000	3	4.8	7.3	14.7	27.3
	2.000	3.7	6.3	10	18.7	38.3
	3.500	5	8.3	10.9	25.7	51.3
100	500	2.1	3.5	5	9	19
	1.000	2.8	4.5	6.8	14	26
	2.000	3.5	6	9.5	18	37
	3.500	4.8	8	10.4	25	50
120	500	—	3.3	4.7	8.5	18.1
	1.000	—	4.3	6.5	13.5	25.1
	2.000	—	5.8	9.2	17.5	36.1
	3.500	—	7.8	10.1	24.5	49.1
160	500	—	—	4.2	7.8	16.8
	1.000	—	—	6	12.8	23.8
	2.000	—	—	8.7	16.8	34.8
	3.500	—	—	9.6	23.8	47.8

Unit: cNm

Note: The values in this table vary depending on the working conditions and are for reference purposes only. The upper limit is 20 % above the value in this table.

DATORKER® strain wave gears

DGC-CO

14. DGC-CO

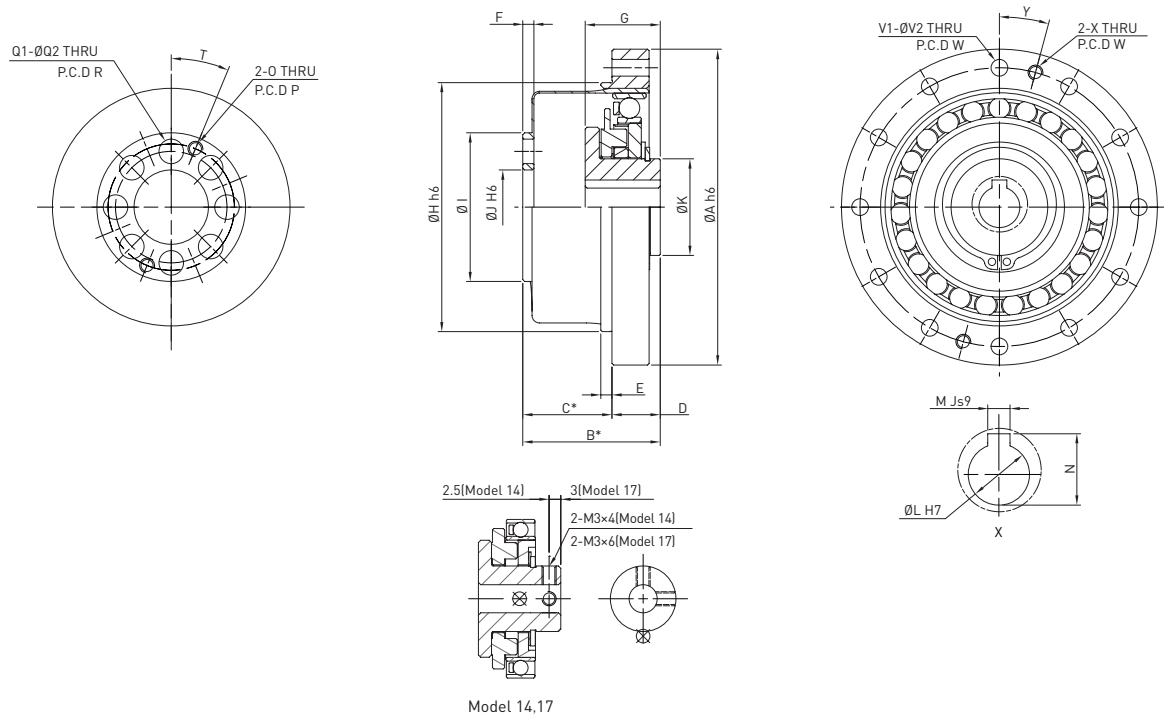


Table 14.1 Dimensions of DGC-CO-Strain wave gears

	Unit	Model/size				
		14	17	20	25	32
ØA h6	mm	50	60	70	85	110
B ¹⁾	mm	28.5 ^{-0.4}	32.5 ^{-0.4}	33.5 ^{-0.4}	37.0 ^{-0.5}	44.0 ^{-0.6}
C ¹⁾	mm	17.5 ^{+0.4}	20.0 ^{+0.5}	21.5 ^{+0.6}	24.0 ^{+0.6}	28.0 ^{+0.6}
D	mm	6.0	6.5	7.5	10.0	14.0
E	mm	2.0	2.5	3.0	3.0	3.0
F	mm	2.4	3.0	3.0	3.0	3.2
G	mm	18.5 ^{-0.1}	20.7 ^{-0.1}	21.5 ^{-0.1}	21.6 ^{-0.1}	23.6 ^{-0.1}
ØH h6	mm	38	48	54	67	90
ØI	mm	23.0	27.2	32.0	40.0	52.0
J H6	mm	11	10	16	20	26
ØK	mm	14	18	21	26	26
ØL H7	mm	6	8	9	11	14
M Js9	mm	—	—	3	4	5
N	mm	—	—	10.4 ^{+0.1}	12.8 ^{+0.1}	16.3 ^{+0.1}
O	mm	M3	M3	M3	M4	M5
P (P.C.D)	mm	18.5	21.5	27.0	34.0	45.0
Q1	mm	6	6	8	8	8
ØQ2	mm	4.5	5.5	5.5	6.6	9.0
R (P.C.D)	mm	17	19	24	30	40
T	Degree	30.0	30.0	22.5	22.5	22.5
V1	mm	8	16	16	16	16
ØV2	mm	3.5	3.5	3.5	4.5	5.5
W (P.C.D)	mm	44	54	62	75	100
X	mm	M3	M3	M3	M4	M5
Y	Degree	22.5	11.25	11.25	11.25	11.25
Moment of inertia	×10 ⁻⁴ kgm ²	0.033	0.079	0.193	0.413	1.69
Weight	kg	0.09	0.15	0.28	0.45	0.89

¹⁾ B and C are the tolerance and the matching position of axial direction.

14.1 DGC-CO design

14.1.1 Technical data

Table 14.2 Accuracy of angular transmission

Reduction ratio		Model/size				
		14	17	20	25	32
50 – 160	$\times 10^{-4}$ rad	4.4	4.4	2.9	2.9	2.9

Table 14.3 Hysteresis loss

Reduction ratio		Model/size				
		14	17	20	25	32
50	$\times 10^{-4}$ rad	5.8	5.8	5.8	5.8	5.8
80 – 160	$\times 10^{-4}$ rad	2.9	2.9	2.9	2.9	2.9

Table 14.4 Starting torque

Reduction ratio		Model/size				
		14	17	20	25	32
50		3.6	5.6	7.3	13	29
80		2.8	3.6	4.5	8.5	18
100		2.3	3.2	4.1	7.6	17
120		—	3.0	3.6	6.9	14
160		—	—	3.2	6.1	13

Unit: cNm

Note: The values in this table vary depending on the working conditions and are for reference purposes only. The upper limit is 20 % above the value in this table.

Table 14.5 Reverse starting torque

Reduction ratio		Model/size				
		14	17	20	25	32
50		1.5	2.8	4.4	8.3	18
80		1.5	2.8	4.6	8.5	18
100		1.9	3.1	5.0	9.2	20
120		—	3.4	5.4	10	21
160		—	—	6.4	12	25

Unit: Nm

Note: The values in this table vary depending on the working conditions and are for reference purposes only. The upper limit is 20 % above the value in this table.

DATORKER® strain wave gears

DGC-CO

Table 14.6 Torsional rigidity							
Reduction ratio			Model/size				
			14	17	20	25	32
T1		Nm	2.0	3.9	7.0	14.0	29.0
T2		Nm	6.9	12.0	25.0	48.0	108.0
50	K ₁	×10 ⁴ Nm/rad	0.34	0.81	1.30	2.50	5.40
	K ₂	×10 ⁴ Nm/rad	0.47	1.10	1.80	3.40	7.80
	K ₃	×10 ⁴ Nm/rad	0.57	1.30	2.30	4.40	9.80
	θ ₁	×10 ⁻⁴ rad	5.8	4.9	5.2	5.5	5.5
	θ ₂	×10 ⁻⁴ rad	16.0	12.0	15.4	15.7	15.7
80 – 160	K ₁	×10 ⁴ Nm/rad	0.47	1.00	1.60	3.10	6.70
	K ₂	×10 ⁴ Nm/rad	0.61	1.40	2.50	5.00	11.00
	K ₃	×10 ⁴ Nm/rad	0.71	1.60	2.90	5.70	12.00
	θ ₁	×10 ⁻⁴ rad	4.1	3.9	4.4	4.4	4.4
	θ ₂	×10 ⁻⁴ rad	12.0	9.7	11.3	11.1	11.6

The values are for reference purposes only. The lower limit is 20 % below the value in this table.

14.1.2 Efficiency E_R

The efficiency of DATORKER® shaft gear units changes depending on the specification, load ratio, operating conditions (speed/load) and lubrication (lubricant type/amount).

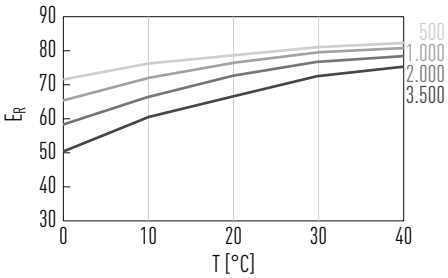
E_R Efficiency at nominal torque

T Temperature

Unit: rpm

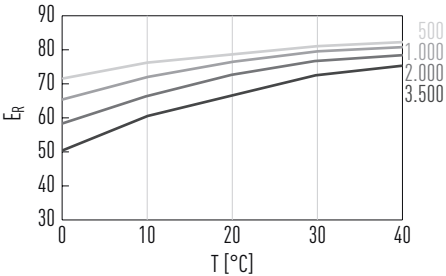
Model: 14

Ratio: 50



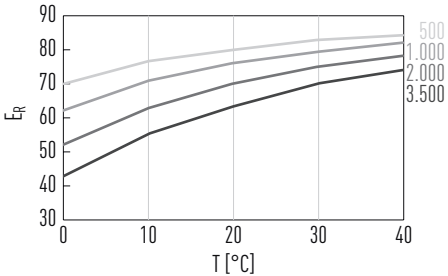
Model: 14

Ratio: 80



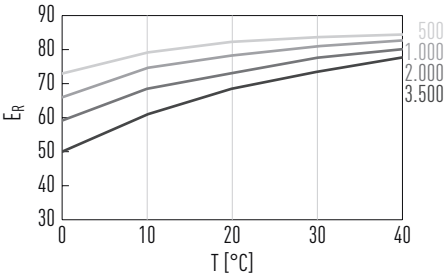
Model: 14

Ratio: 100



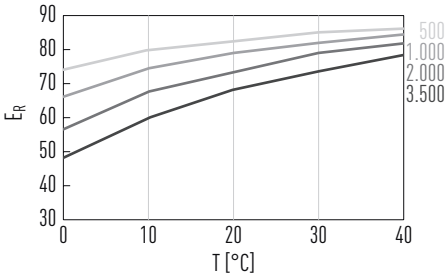
Model: 17-32

Ratio: 50



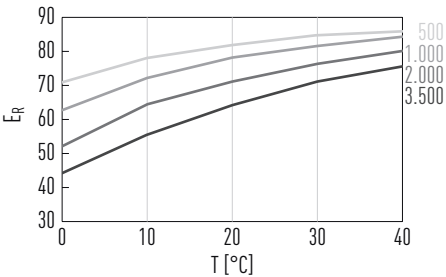
Model: 17-32

Ratio: 80, 100



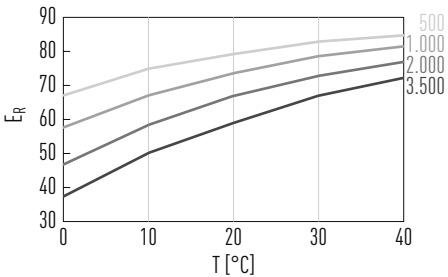
Model: 17-32

Ratio: 120



Model: 20-32

Ratio: 160



Correction coefficient α

$$\text{Efficiency} = \alpha \times E_R$$

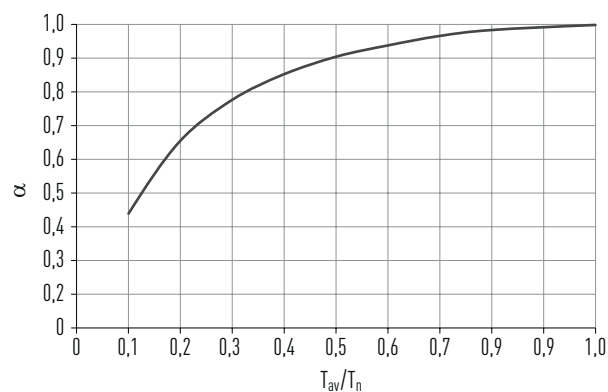
α Correction coefficient

E_R Efficiency at nominal torque

T_{av} Average load torque

T_n Rated torque

T_{av}/T_n Torque ratio



14.1.3 Idling operating torque

The idling operating torque is the torque required to drive the DATORKER® shaft gear input (high speed end) after more than 2 hours at an input speed of 2,000 rpm at an average ambient temperature of 25 °C without load.

Table 14.7 Idling operating torque

Reduction ratio	Input speed [rpm]	Model/size				
		14	17	20	25	32
50	500	1.8	3.4	5.1	9.7	21.2
	1.000	2.3	4.4	6.9	12.5	27.2
	2.000	3.1	5.8	9.4	18.5	37.2
	3.500	4.2	7.9	13.4	25.5	50.2
80	500	1.4	2.6	3.9	7.6	16.8
	1.000	1.9	3.6	5.7	10.4	22.8
	2.000	2.7	5.0	8.2	16.4	32.8
	3.500	3.8	7.1	12.2	23.4	45.8
100	500	1.3	2.5	3.7	7.2	16.0
	1.000	1.8	3.5	5.5	10.0	22.0
	2.000	2.6	4.9	8.0	16.0	32.0
	3.500	3.7	7.0	12.0	23.0	45.0
120	500	—	2.4	3.5	6.9	15.4
	1.000	—	3.4	5.2	9.7	21.4
	2.000	—	4.8	7.8	15.7	31.4
	3.500	—	6.9	11.8	22.7	44.4
160	500	—	—	3.4	6.6	14.8
	1.000	—	—	5.2	9.4	20.8
	2.000	—	—	7.7	15.4	30.8
	3.500	—	—	11.7	22.4	43.8

Unit: cNm

Note: The values in this table vary depending on the working conditions and are for reference purposes only. The upper limit is 20 % above the value in this table.